ABSTRACT OF THE DISCLOSURE

Systems and methods are described for controlling congestion, such as within the transport control protocol (TCP) based on bandwidth estimation techniques which provide explicit indications of back-to-back packet traffic. In response to registered back-to-back traffic, receiver-side bandwidth estimation techniques are exploited to enhance the congestion control behavior of TCP based networks. By way of example, a sender marks packets in the header or by changing segment size within a packet to indicate whether the packet is being sent back-to-back. A receiver utilizes the explicit back-to-back information, optionally in conjunction with other back-to-back packet estimation techniques, when estimating available bandwidth and setting congestion parameters. In addition a mechanism for controlling the length of packet trains is described which is based on modulating the transmission of delayed acknowledgements, such as sending acknowledgements upon receipt of a selected number of packets.